

WHAT IS CLAIMED IS:

- 1                   1.       A system for storing data, comprising:  
2                   a first storage area to store data;  
3                   a second storage area to store data;  
4                   a first storage control unit configured to control the first storage area; and  
5                   a second storage control unit configured to control the second storage area;  
6                   wherein, in response to a first write request issued to write data in the first  
7 storage area, the first storage control unit is configured to write data associated with the first  
8 write request to the first storage area and to transfer the first write request to the second  
9 storage control unit, the second storage control unit being configured to write the data  
10 associated with the first write request to the second storage area; and  
11                   wherein, in response to a second write request issued to write data in the  
12 second storage area, the second storage control unit is configured to transfer the second write  
13 request to the first storage control unit.
- 1                   2.       The system according to claim 1 wherein, in response to the second  
2 write request issued to write data in the second storage area, the second storage control unit is  
3 configured to transfer the second write request to the first storage control unit prior to writing  
4 data associated with the second write request to the second storage area.
- 1                   3.       The system according to claim 1 wherein the first storage control unit  
2 is configured, in response to the transferred second write request from the second storage  
3 control unit, to write data associated with the second write request to the first storage area and  
4 to transfer the second write request to the second storage control unit.
- 1                   4.       The system according to claim 3 wherein the second storage control  
2 unit is configured, in response to the second write request transferred from the first storage  
3 control unit, to write the data associated with the second write request to the second storage  
4 area.
- 1                   5.       In a group of storage systems including a first storage system  
2 configured to process requests from a first host system and a second storage system  
3 configured to process requests from a second host system and to control a second storage  
4 area, the first storage system comprising:  
5                   a first storage area to store data; and

6 a first storage control unit configured to control the first storage area;  
7 wherein the first storage control unit is configured, in response to a first write  
8 request issued to write data in the first storage area from the first host system, to write data  
9 associated with the first write request to the first storage area; and  
10 wherein the first storage control unit is configured, in response to a second  
11 write request issued to write data in the second storage area by the second host system, to  
12 receive the second write request prior to writing data associated with the second write request  
13 to the second storage area.

1 6. The first storage system according to claim 5 wherein the first storage  
2 control unit is configured, in response to the second write request issued to write data in the  
3 second storage area by the second host system, to transfer the second write request to the  
4 second storage system to write the data associated with the second write request to the second  
5 storage area.

1 7. The first storage system according to claim 5 wherein the first storage  
2 control unit is configured, in response to the received second write request, to write data  
3 associated with the second write request to the first storage area and to transfer the second  
4 write request to the second storage system to write the data associated with the second write  
5 request to the second storage area.

1 8. In a group of storage systems including a first storage system  
2 configured to process requests from a first host system and to control a first storage area and  
3 a second storage system configured to process requests from a second host system, the  
4 second storage system comprising:

5 a second storage area to store data; and  
6 a second storage control unit configured to control the second storage area;  
7 wherein the second storage control unit is configured, upon receipt from the  
8 first storage control unit of a first write request issued to write data in the first storage area  
9 from the first host system, to write data associated with the first write request to the second  
10 storage area; and

11 wherein the second storage control unit is configured, in response to a second  
12 write request issued to write data in the second storage area from the second host system, to  
13 transfer the second write request to the first storage system to write data associated with the

14 second write request to the first storage area prior to writing the data associated with the  
15 second write request to the second storage area.

1 9. The second storage system according to claim 8 wherein the second  
2 storage control unit is configured to receive the second write request from the first storage  
3 system.

1 10. The second storage system according to claim 9 wherein the second  
2 storage control unit is configured to write the data associated with the second write request to  
3 the second storage area in response to the second write request received from the first storage  
4 system.

1 11. A method of storing data in storage devices, the method comprising:  
2 in response to a first write request issued to write data in a first storage area,  
3 using a first storage control unit to write data associated with the first write request to the first  
4 storage area and transferring the first write request to a second storage control unit to write  
5 the data associated with the first write request to a second storage area; and  
6 in response to a second write request issued to write data in the second storage  
7 area, transferring the second write request from the second storage control unit to the first  
8 storage control unit prior to writing data associated with the second write request to the  
9 second storage area.

1 12. The method according to claim 11 wherein, in response to the second  
2 write request issued to write data in the second storage area, the second write request is  
3 transferred from the second storage control unit to the first storage control unit prior to  
4 writing data associated with the second write request to the second storage area.

1 13. The method according to claim 11 further comprising, in response to  
2 the transferred second write request from the second storage control unit to the first storage  
3 control unit, using the first storage control unit to write data associated with the second write  
4 request to the first storage area and to transfer the second write request to the second storage  
5 control unit.

1 14. The method according to claim 13 further comprising, in response to  
2 the second write request transferred from the first storage control unit, using the second

3 storage control unit to write the data associated with the second write request to the second  
4 storage area.

1 15. A method of storing data, the method comprising:  
2 in response to a first write request issued to write data in a first storage area  
3 from a first host system, writing data associated with the first write request to the first storage  
4 area and transferring the first write request to a second storage control unit to write the data  
5 associated with the first write request to a second storage area; and  
6 in response to a second write request issued to write data in the second storage  
7 area by a second host system, receiving the second write request to write data associated with  
8 the second write request to the first storage area prior to writing the data associated with the  
9 second write request to the second storage area.

1 16. The method according to claim 15 further comprising, in response to  
2 the received second write request, writing data associated with the second write request to the  
3 first storage area and transferring the second write request to the second storage control unit  
4 to write the data associated with the second write request to the second storage area.

1 17. A method of storing data, the method comprising:  
2 upon receipt from a first storage control unit of a first write request issued to  
3 write data in a first storage area from a first host system, writing data associated with the first  
4 write request to a second storage area; and  
5 in response to a second write request issued to write data in the second storage  
6 area from a second host system, transferring the second write request to the first storage  
7 control unit to write data associated with the second write request to the first storage area  
8 prior to writing the data associated with the second write request to the second storage area.

1 18. The method according to claim 17 further comprising receiving the  
2 second write request from the first storage control unit.

1 19. The method according to claim 18 further comprising writing the data  
2 associated with the second write request to the second storage area in response to the second  
3 write request received from the first storage control unit.

1 20. A system for storing data, comprising:  
2 a first storage area to store data;

3                   a second storage area to store data;  
4                   a first storage control unit configured to control the first storage area, the first  
5 storage control unit including a first connection to connect with a first host system;  
6                   a second storage control unit configured to control the second storage control  
7 unit, the second storage control unit including a second connection to connect with a second  
8 host system;  
9                   a first path through which data is transferred between the first connection and  
10 the first storage area;  
11                  a second path through which data is transferred between the first storage area  
12 and the second storage control unit;  
13                  a third path through which data is transferred between the second storage  
14 control unit and the second storage area; and  
15                  a fourth path through which data is transferred between the second connection  
16 and the first storage control unit.

1                  21.     The system according to claim 20 further comprising a fifth path  
2 through which data is transferred between the first storage control unit and the first storage  
3 area.

1                  22.     The system according to claim 21 wherein the first storage control unit  
2 is configured to transfer the data, which is transferred from the first storage control unit  
3 through the fifth path to the first storage area, from the first storage control unit to the second  
4 storage control unit through the second path, and wherein the second storage control unit is  
5 configured to store the data, which is transferred through the second path from the first  
6 storage control unit to the second storage control unit, in the second storage area through the  
7 third path.

1                  23.     In a group of storage systems including a first storage system, and a  
2 second storage system having a second connection to connect with a second host system and  
3 a second storage control unit to control a second storage area, the first storage system  
4 comprising:  
5                   a first storage area to store data; and  
6                   a first storage control unit configured to control the first storage area, the first  
7 storage control unit including a first connection to connect with a first host system;

8 a first path through which data is transferred between the first connection and  
9 the first storage area;

10 a second path through which data is transferred between the first storage  
11 control unit and the second storage control unit; and

12 a third path through which data is transferred between the second connection  
13 and the first storage control unit.

1 24. The first storage system according to claim 23 further comprising a  
2 fourth path through which data is transferred between the first storage control unit and the  
3 first storage area.

1 25. The first storage system according to claim 24 wherein the first storage  
2 control unit is configured to transfer the data, which is transferred from the first storage  
3 control unit to the first storage area through the fourth path, from the first storage control unit  
4 through the second path to the second control unit to store the data in the second storage area.

1 26. In a group of storage systems including a first storage system having a  
2 first connection to connect with a first host system and a first storage control unit to control a  
3 first storage area, and a second storage system, the second storage system comprising:

4 a second storage area to store data; and

5 a second storage control unit configured to control a second storage area, the  
6 second storage control unit including a second connection to connect with a second host  
7 system;

8 a first path through which data is transferred between the second connection  
9 and the first storage control unit; and

10 a second path through which data is transferred between the first storage  
11 control unit and the second storage control unit.

1 27. The second storage system according to claim 26 further comprising a  
2 third path through which data is transferred between the second storage control unit and the  
3 second storage area.

1 28. A system for storing data, comprising:

2 a first storage area to store data;

3 a second storage area to store data;

4 a first storage control unit configured to control the first storage area; and

5 a second storage control unit configured to control the second storage area;  
6 wherein, in response to a first write request issued to write data in the first  
7 storage area and if the first storage area has a status which is neither reserved nor exclusive,  
8 the first storage control unit is configured to obtain an exclusive status of the first storage area  
9 and to write data associated with the first write request to the first storage area, and to transfer  
10 the first write request to the second storage control unit to obtain an exclusive status of the  
11 second storage area, the second storage control unit being configured to write the data  
12 associated with the first write request received from the first storage control unit to the  
13 second storage area; and  
14 wherein, in response to a second write request issued to write data in the  
15 second storage area and if the second storage area has a status which is neither reserved nor  
16 exclusive, the second storage control unit is configured to transfer the second write request to  
17 the first storage control unit.

1 29. The system according to claim 28 wherein, in response to the second  
2 write request issued to write data in the second storage area and if the second storage area has  
3 a status which is neither reserved nor exclusive, the second storage control unit is configured  
4 to transfer the second write request to the first storage control unit prior to writing data  
5 associated with the second write request to the second storage area.

1 30. The system according to claim 28 wherein the first storage control unit  
2 is configured, in response to the transferred second write request from the second storage  
3 control unit and if the first storage area has a status which is neither reserved nor exclusive, to  
4 obtain an exclusive status of the first storage area and write data associated with the second  
5 write request to the first storage area.

1 31. The system according to claim 30 wherein the second storage control  
2 unit is configured, after transferring the second write request to the first storage control unit  
3 and if the first storage area has a status which is neither reserved nor exclusive, to transfer the  
4 data associated with the second write request to the first storage control unit to be written to  
5 the first storage unit.

1 32. The system according to claim 28 wherein the second storage control  
2 unit is configured, if the first storage area has a status which is neither reserved nor exclusive  
3 so that the first storage control unit can obtain the exclusive status of the first storage area, to

4 obtain an exclusive status of the second storage area and to write the data associated with the  
5 second write request to the second storage area.

1                   33. In a group of storage systems including a first storage system  
2 configured to process requests from a first host system and a second storage system  
3 configured to process requests from a second host system and to control a second storage  
4 area, the first storage system comprising:

5                   a first storage area to store data; and

6                   a first storage control unit configured to control the first storage area;

7                   wherein the first storage control unit is configured, in response to a first write  
8 request issued to write data in the first storage area from the first host system and if the first  
9 storage area has a status which is neither reserved nor exclusive, to obtain an exclusive status  
10 of the first storage area and to write data associated with the first write request to the first  
11 storage area and to transfer the first write request to the second storage system to obtain an  
12 exclusive status of the second storage area and to write the data associated with the first write  
13 request to the second storage area; and

14                  wherein the first storage control unit is configured, in response to a second  
15 write request issued to write data in the second storage area by the second host system and if  
16 the second storage area has a status which is neither reserved nor exclusive, to receive the  
17 second write request prior to writing data associated with the second write request to the  
18 second storage area.

1                   34. The first storage system according to claim 33 wherein the first storage  
2 control unit is configured, in response to the received second write request and if the first  
3 storage area has a status which is neither reserved nor exclusive, to obtain an exclusive status  
4 of the first storage area and to write data associated with the second write request to the first  
5 storage area.

1                   35. The first storage system according to claim 34 wherein the first storage  
2 control unit is configured to, after receiving the second write request and if the first storage  
3 area has a status which is neither reserved nor exclusive, to receive data associated with the  
4 second write request from the second storage control unit to be written to the first storage  
5 area.



1                   36.     In a group of storage systems including a first storage system  
2 configured to process requests from a first host system and to control a first storage area and  
3 a second storage system configured to process requests from a second host system, the  
4 second storage system comprising:

5                   a second storage area to store data; and

6                   a second storage control unit configured to control the second storage area;

7                   wherein the second storage control unit is configured, upon receipt from the  
8 first storage control unit of a first write request issued to write data in the first storage area  
9 from the first host system, to obtain an exclusive status of the second storage area and to  
10 write data associated with the first write request to the second storage area; and

11                  wherein the second storage control unit is configured, in response to a second  
12 write request issued to write data in the second storage area from the second host system and  
13 if the second storage area has a status which is neither reserved nor exclusive, to transfer the  
14 second write request to the first storage system to write data associated with the second write  
15 request to the first storage area if the first storage area has a status which is neither reserved  
16 nor exclusive so that the first storage control unit can obtain an exclusive status of the first  
17 storage area.

1                   37.     The second storage system according to claim 36 wherein the second  
2 storage control unit is configured, in response to the second write request issued to write data  
3 in the second storage area from the second host system and if the second storage area has a  
4 status which is neither reserved nor exclusive, to transfer the second write request to the first  
5 storage system to write data associated with the second write request to the first storage area  
6 if the first storage area has a status which is neither reserved nor exclusive so that the first  
7 storage control unit can obtain an exclusive status of the first storage area, prior to writing the  
8 data associated with the second write request to the second storage area.

1                   38.     The second storage system according to claim 36 wherein the second  
2 storage control unit is configured to obtain an exclusive status of the second storage area and  
3 to write the data associated with the second write request to the second storage area, if the  
4 first storage area has a status which is neither reserved nor exclusive so that the first storage  
5 control unit can obtain an exclusive status of the first storage area.

1                   39.     A method of storing data in storage devices, the method comprising:

2 in response to a first write request issued to write data in a first storage area  
3 and if the first storage area has a status which is neither reserved nor exclusive, using a first  
4 storage control unit to obtain an exclusive status of the first storage area and to write data  
5 associated with the first write request to the first storage area, and transferring the first write  
6 request to a second storage control unit to obtain an exclusive status of the second storage  
7 area and to write the data associated with the first write request to the second storage area;  
8 and

9 in response to a second write request issued to write data in the second storage  
10 area and if the second storage area has a status which is neither reserved nor exclusive,  
11 transferring the second write request from the second storage control unit to the first storage  
12 control unit.

1 40. The method according to claim 39 wherein in response to the second  
2 write request issued to write data in the second storage area and if the second storage area has  
3 a status which is neither reserved nor exclusive, the second write request is transferred from  
4 the second storage control unit to the first storage control unit prior to writing data associated  
5 with the second write request to the second storage area.

1 41. The method according to claim 39 further comprising, in response to  
2 the transferred second write request from the second storage control unit to the first storage  
3 control unit and if the first storage area has a status which is neither reserved nor exclusive,  
4 using the first storage control unit to obtain an exclusive status of the first storage area and to  
5 write data associated with the second write request to the first storage area.

1 42. The method according to claim 41 further comprising, if the first  
2 storage area has a status which is neither reserved nor exclusive so that the first storage  
3 control unit can obtain an exclusive status of the first storage area, using the second storage  
4 control unit to reserve an exclusive status of the second storage area and to write data  
5 associated with the second write request to the second storage area.

1 43. A method of storing data, the method comprising:  
2 in response to a first write request issued to write data in a first storage area  
3 from a first host system and if the first storage area has a status which is neither reserved nor  
4 exclusive, obtaining an exclusive status of the first storage area and writing data associated  
5 with the first write request to the first storage area, and transferring the first write request to a

6 second storage control unit to obtain an exclusive status of a second storage area and to write  
7 the data associated with the first write request to the second storage area; and  
8 in response to a second write request issued to write data in the second storage  
9 area by a second host system and if the second storage area has a status which is neither  
10 reserved nor exclusive, receiving the second write request to write data associated with the  
11 second write request to the first storage area prior to writing the data associated with the  
12 second write request to the second storage area.

1 44. The method according to claim 43 further comprising, in response to  
2 the received second write request and if the first storage area has a status which is neither  
3 reserved nor exclusive, obtaining an exclusive status of the first storage area and writing data  
4 associated with the second write request to the first storage area.

1 45. A method of storing data, the method comprising:  
2 upon receipt from a first storage control unit of a first write request issued to  
3 write data in a first storage area from a first host system, obtaining an exclusive status of a  
4 second storage area and writing data associated with the first write request to the second  
5 storage area; and  
6 in response to a second write request issued to write data in the second storage  
7 area from a second host system and if the second storage area has a status which is neither  
8 reserved nor exclusive, transferring the second write request to the first storage control unit to  
9 write data associated with the second write request to the first storage area.

1 46. The method according to claim 45 wherein in response to the second  
2 write request issued to write data in the second storage area from a second host system and if  
3 the second storage area has a status which is neither reserved nor exclusive, the second write  
4 request is transferred to the first storage control unit to write data associated with the second  
5 write request to the first storage area prior to writing the data associated with the second write  
6 request to the second storage area.

1 47. The method according to claim 45 further comprising, if the first  
2 storage area has a status which is neither reserved nor exclusive so that the first storage  
3 control unit can obtain an exclusive status of the first storage area, obtaining an exclusive  
4 status of the second storage area and writing the data associated with the second write request  
5 to the second storage area.

1                   48.     A system for storing data, comprising:  
2                   a first storage area to store data;  
3                   a second storage area to store data;  
4                   a first storage control unit configured to control the first storage area, the first  
5 storage control unit including a first connection to connect with a first host system;  
6                   a second storage control unit configured to control the second storage area, the  
7 second storage control unit including a second connection to connect with a second host  
8 system;  
9                   a first path through which data is transferred between the first connection and  
10 the first storage area, after the first storage control unit obtains an exclusive status of the first  
11 storage area;  
12                   a second path through which data is transferred between the first storage  
13 control unit and the second storage control unit;  
14                   a third path through which data is transferred between the second storage  
15 control unit and the second storage area, after the second storage control unit obtains an  
16 exclusive status of the second storage area; and  
17                   a fourth path through which data is transferred between the second connection  
18 and the first storage control unit, if the second storage area has a status which is neither  
19 reserved nor exclusive so that the second storage control unit can obtain an exclusive status  
20 of the second storage area.

1                   49.     The system according to claim 48 further comprising a fifth path  
2 through which data is transferred between the first storage control unit and the first storage  
3 area, after the first storage control unit obtains an exclusive status of the first storage area.

1                   50.     The system according to claim 49 wherein the second storage control  
2 unit is configured to obtain an exclusive status of the second storage area and to store the data  
3 in the second storage area through the third path, if the first storage area has a status which is  
4 neither reserved nor exclusive so that the first storage control unit can obtain an exclusive  
5 status of the first storage area.

1                   51.     In a group of storage systems including a first storage system, and a  
2 second storage system having a second connection to connect with a second host system and

a second storage control unit to control a second storage area, the first storage system comprising:

- a first storage area to store data; and
- a first storage control unit configured to control the first storage area, the first storage control unit including a first connection to connect with a first host system;
- a first path through which data is transferred between the first connection and the first storage area, after the first storage control unit obtains an exclusive status of the first storage area;
- a second path through which data is transferred between the first storage control unit and the second storage control unit; and
- a third path through which data is transferred between the second connection and the first storage control unit, if the second storage area has a status which is neither reserved nor exclusive so that the second storage control unit can obtain an exclusive status of the second storage area.

52. The first storage system according to claim 51 further comprising a fourth path through which data is transferred between the first storage control unit and the first storage area, after the first storage control unit obtains an exclusive status of the first storage area.

53. In a group of storage systems including a first storage system having a first connection to connect with a first host system and a first storage control unit to control a first storage area, and a second storage system, the second storage system comprising:

- a second storage area to store data; and
- a second storage control unit configured to control a second storage area, the second storage control unit including a second connection to connect with a second host system;
- a first path through which data is transferred between the second connection and the first storage control unit, if the second storage area has a status which is neither reserved nor exclusive so that the second storage control unit can obtain an exclusive status of the second storage area; and
- a second path through which data is transferred between the first storage control unit and the second storage control unit.

1                    54.     The second storage system according to claim 53 further comprising a  
2     third path through which data is transferred between the second storage control unit and the  
3     second storage area, after the second storage control unit obtains an exclusive status of the  
4     second storage area.